PATENT ABSTRACTS OF JAPAN

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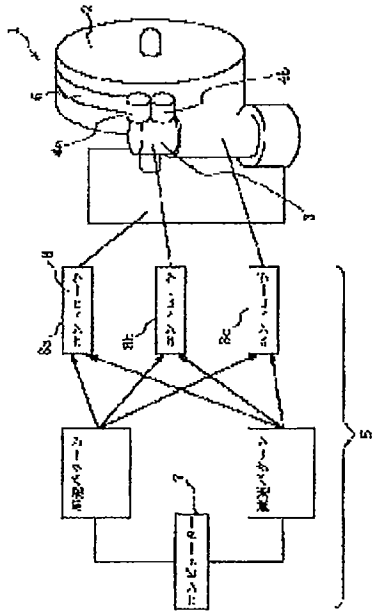
(54) APPARATUS AND METHOD FOR MOLDING TIRE COMPONENT

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an apparatus and the like for molding a tire component for suppressing occurrence of inconvenience such as breaking of a strip, discharge of excess rubber and the like in a non-stationary state wherein a rolling speed of a rotator, a strip supply speed of a strip supply means and a rolling speed of a roll are difficult to be stabilized.
SOLUTION: The apparatus comprises a rotator 2, a strip supply means 3, a pair of rolls 4a, 4b and a speed controlling means 5. The speed control means 5 calculates changes of respective speeds V1-V3 with time when the strip 6 is appropriately stuck in a time of sticking the strip wherein the rolling speed V1 of the rotator 2, a strip supply speed V2 of the strip supply means 3 and the rolling speed V3 of the rolls 4a, 4b are in a non-stationary state. While the strip 6 is stuck under the non-stationary state, the rolling speed V1 of the rotator 2, the strip supply speed V2 of the strip supply means 3 and the rolling speed V3 of the rolls 4a, 4b are controlled based on the calculated results.



CLAIMS

[Claim(s)]
[Claim 1]
A solid of revolution with an outside surface of cylindrical shape or toroid shape,
A strip feeding means which supplies a ribbon base strip to this solid of revolution,
A roll of a couple spirally stuck while counter a solid of revolution, it is located, and said strip supplied from a strip feeding means is conveyed toward a solid of revolution and said strip is pressed on an outside surface of a solid of revolution,
A speed control means which controls revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll,
In a molding apparatus of a ******** tire member,
Revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll a speed control means in a strip attachment period which is an unstationary state. Revolving speed of a solid of revolution when a strip is able to be stuck properly, A change with time of a strip speed of supply of a strip feeding means and revolving speed of a roll is computed, respectively, A molding apparatus of a tire member characterized by controlling revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll based on this computed result while sticking a strip by said unstationary state.
[Claim 2]
Molding equipment of the tire member according to claim 1 which is a period of at least 1 of the attachment last stages including the time of early stages of attachment when a strip attachment period which is an unstationary state includes the time of an attachment start, and an end of attachment.
[Claim 3]
A molding apparatus of the tire member according to claim 1 or 2 characterized by comprising the following.
A calculating means which computes a change with time of revolving speed of a solid of revolution when the speed control means is able to stick a strip properly in a strip attachment period which is an unstationary state, a strip speed of supply of a strip feeding means, and revolving speed of a roll, respectively.
A controller which controls properly revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll based on a result computed by a calculating means.

[Claim 4]
When a speed control means sets [revolving speed of a solid of revolution] V2 and revolving speed of a roll to V3 for a strip speed of supply of V1 and a strip feeding means, A molding apparatus of the tire member according to claim 2 or 3 controlled by an acceleration pattern which fills a relation which is V1=V3 and V2-/V3 ratio dwindles in early stages of the attachment including the time of an attachment start.
[Claim 5]
When a speed control means sets [revolving speed of a solid of revolution] V2 and revolving speed of a roll to V3 for a strip speed of supply of V1 and a strip feeding means, A molding apparatus of the tire member according to claim 2, 3, or 4 controlled by a deceleration pattern which is V1=V3 and fills a relation of V3>V2 with the attachment last stage including the time of an end of attachment.
[Claim 6]
Controlling revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll by a speed control means. In a molding method of a tire member spirally

stuck while conveying a ribbon base strip on a solid of revolution via a roll of a couple from a strip feeding means and pressing a strip with a roll on an outside surface of a solid of revolution, Revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll a speed control means in a strip attachment period which is an unstationary state. Revolving speed of a solid of revolution when a strip is able to be stuck properly, A change with time of a strip speed of supply of a strip feeding means and revolving speed of a roll is computed, respectively, A molding method of a tire member characterized by controlling revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll based on this computed result while sticking a strip by said unstationary state.

[Claim 7]

A speed control means has a calculating means and a controller, and a calculating means in a strip attachment period which is an unstationary state. Revolving speed of a solid of revolution when a strip is able to be stuck properly, A change with time of a strip speed of supply of a strip feeding means and revolving speed of a roll is computed, respectively, A molding method of the tire member according to claim 6 which transmits a computed result to a controller and with which a controller controls revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll based on a transmitted computed result.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]
Especially this invention like the early stages of attachment including the time of an attachment start, and the attachment last stage including the time of the end of attachment, It is related with the molding apparatus and molding method of a tire member which controlled effectively generating of faults, such as a fracture of a strip, and regurgitation of excessive rubber, in the unstationary state where the speed balance of the revolving speed of a solid of revolution, the strip speed of supply of a strip feeding means, and the revolving speed of a roll is not stabilized easily.
[0002]
[Description of the Prior Art]
In order to make diameter expansion deformation in a tire molding process as small as possible and to raise the quality of product tires, such as uniformity, in recent years, Without preparing individually tire members, such as an inner liner, a bead filler, side rubber, and tread rubber, It laminates until it carries out time winding two or more rounds spirally and the shape of a predetermined tire member is obtained, pressing a ribbon base strip with a roll on the rigid body core which has the inner surface shape of a product tire, and the approximated outside surface shape, What is called the core molding method for forming a green tire and manufacturing a tire by carrying out vulcanization molding of this green tire with a rigid body core is proposed.
[0003]
When sticking a ribbon base strip on a rigid body core in the core molding method, it is necessary to control the revolving speed of a solid of revolution, for example, a rigid body core, a strip feeding means, for example, the strip speed of supply of an extruder, and the revolving speed of a roll, respectively but, and. It was common to have stuck such speed from the time of an attachment start, and to have controlled them by fixed speed balance in all the attachment periods over the time of an end conventionally.
[0004]
However, even if it is a case where it sets up control the revolving speed of a rigid body core, the strip speed of supply of an extruder, and the revolving speed of a roll by fixed speed balance, Since each driving means, for example, the performance of a motor, differs from the speed of response (sensitivity) at the time of acceleration and a slowdown (at the time of a motor operation) (at the time of a motor stop) in many cases, actually, In an unstationary state like the case like the early stages of attachment including the time of an attachment start, and the attachment last stage including the time of the end of attachment. The speed balance of the revolving speed of a rigid body core, the strip speed of supply of an extruder, and the revolving speed of a roll has collapsed in many cases, and, in this case, there was a possibility that there might be no proper attachment on the outside surface of a solid of revolution about a strip in ******.
[0005]
When a ribbon base strip is especially stuck on the outside surface of a rigid body core at high speed for Hitoshi Kougami of attachment efficiency, in early stages of the attachment including the time of an attachment start, Since the extrusion speed of the ribbon base strip extruded from an extruder tends to become quite slower than the value of the speed balance to the revolving speed of the solid of revolution which sticks the strip, If the ribbon base strip extruded from the cap of the extruder carries out the quick stop of the attachment of a ribbon base strip like the attachment last stage which a fracture may occur between a cap and a pasting roll, and includes the time of the end of attachment, Since the extrusion speed of the ribbon base strip extruded from an extruder tends to become quite quicker than the value of the speed balance to the revolving speed of the solid of

revolution which sticks the strip, it is necessary to remove separately manually etc. the excessive rubber which excessive rubber is breathed out by the residual pressure in the head of an extruder at, is easy, and starts -- etc. -- various faults arose.
[0006]
[Problem(s) to be Solved by the Invention]
The purpose of this invention by attaining rationalization of the speed balance of the revolving speed of a solid of revolution, the strip speed of supply of a strip feeding means, and the revolving speed of a roll, Like the attachment last stage including the time of the early stages of attachment including especially the time of an attachment start, and the end of attachment, It is in providing the molding apparatus and molding method of a tire member which controlled effectively generating of faults, such as a fracture of a strip, and regurgitation of excessive rubber, in the unstationary state where the revolving speed of a solid of revolution, the strip speed of supply of a strip feeding means, and the revolving speed of a roll are not stabilized easily.
[0007]
[Means for Solving the Problem]
In order to attain the above-mentioned purpose, a molding apparatus of a tire member of this invention, A solid of revolution with an outside surface of cylindrical shape or toroid shape, and a strip feeding means which supplies a ribbon base strip to this solid of revolution, A roll of a couple spirally stuck while counter a solid of revolution, it is located, and said strip supplied from a strip feeding means is conveyed toward a solid of revolution and said strip is pressed on an outside surface of a solid of revolution, In a molding apparatus of a tire member which it has, a speed control means which controls revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll a speed control means, Revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll in a strip attachment period which is an unstationary state. Revolving speed of a solid of revolution when a strip is able to be stuck properly, A change with time of a strip speed of supply of a strip feeding means and revolving speed of a roll is computed, respectively, While sticking a strip by said unstationary state, it is in controlling revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll based on this computed result.
[0008]
"A strip attachment period which is an unstationary state" here means a period of at least 1 of the attachment last stages including the time of early stages of attachment including the time of an attachment start, and an end of attachment.
[0009]
In a strip attachment period whose speed control means is an unstationary state. A calculating means which computes a change with time of revolving speed of a solid of revolution when a strip is able to be stuck properly, a strip speed of supply of a strip feeding means, and revolving speed of a roll, respectively, It is preferred to have a controller which controls properly revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll based on a result computed by a calculating means.
[0010]
When a speed control means sets [revolving speed of a solid of revolution] V2 and revolving speed of a roll to V3 for a strip speed of supply of V1 and a strip feeding means, It is preferred to control by a deceleration pattern which is V1=V3 and fills a relation of V3>V2 with to control by an acceleration pattern which fills a relation which is V1=V3 and V2-/V3 ratio dwindles in early stages of the attachment including the time of an attachment start, and/or the attachment last stage including the time of an end of attachment. It is preferred to stick on an outside surface of a solid of revolution, setting up V2-/V3 ratio in early stages of the attachment which includes the time of an attachment start especially gradually decrease from 1 to proper V2-/V3 ratio of a stationary state, and applying a proper tension to said strip. Although proper V2-/V3 ratio of a stationary state changes also with kinds (for example, a size of a strip, gum, rubber discharge temperature of an extruder, etc.) of ribbon base strip to stick, it is preferred for it that it is the range of 0.3-0.7.
[0011]
A molding method of a tire member of this invention, controlling revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll by a speed control means. In a molding method of a tire member spirally stuck while conveying a ribbon base strip on a solid of revolution via a roll of a couple from a strip feeding means and pressing a strip with a roll on an outside surface of a solid of revolution, Revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll a speed control means in a

strip attachment period which is an unstationary state. Revolving speed of a solid of revolution when a strip is able to be stuck properly, A change with time of a strip speed of supply of a strip feeding means and revolving speed of a roll is computed, respectively, While sticking a strip by said unstationary state, it is in controlling revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll based on this computed result.
[0012]
In a strip attachment period whose calculating means a speed control means has a calculating means and a controller, and is an unstationary state. Revolving speed of a solid of revolution when a strip is able to be stuck properly, A change with time of a strip speed of supply of a strip feeding means and revolving speed of a roll is computed, respectively, It is preferred that transmit a computed result to a controller and a controller controls revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll based on a transmitted computed result.
[0013]
[Embodiment of the Invention]
Hereafter, an example of this embodiment of the invention is explained in detail, referring to drawings.

Drawing 1 shows an example of the molding apparatus 1 of a tire member according to this invention.
[0014]
The solid of revolution 2, the strip feeding means 3, and a couple roll the molding apparatus 1 of the tire member shown in drawing 1 4a and 4b, and it mainly comprises the speed control means 5. Drawing 2 is shown in order to explain the physical relationship of the rolls 4a and 4b of the solid of revolution 2, the strip feeding means 3, and a couple, and the attachment state of a ribbon base rubber strip.
[0015]
Although it has an outside surface of cylindrical shape or toroid shape and drawing 1 has shown the case where it is a rigid body core as an example of a hard core process, like a raw case, a green tire, a bladder, and a molding drum, the solid of revolution 2 should just be a solid of revolution with the outside surface of cylindrical shape or toroid shape, and does not carry out limitation in particular.
[0016]
Are for the strip feeding means 3 supplying the ribbon base rubber strip 6 to this solid of revolution 2, and in drawing 1. Although the extruder 3 which supplies the ribbon base strip 6 by extruding the rubber of predetermined sectional shape from the cap 3a, and the case where it is a screw motor control type extruder especially are shown, A piston delivery speed control type extruder and a screw and gearmotor control type extruder may be used, and limitation in particular is not carried out. For example, time spiral winding of the ribbon base strip produced beforehand may be carried out two or more rounds spirally, and a ribbon base strip may be supplied from this coiled member as a coiled member.
[0017]
While the rolls 4a and 4b of a couple convey said strip 6 which countered the solid of revolution 2, was located and was supplied from the strip feeding means 3 toward the solid of revolution 2, Pressing said strip 6 on the outside surface of the solid of revolution 2, the roll 4a of any one of these rolls 4a and 4b is allocated so that it may stick spirally.
[0018]
The speed control means 5 controls the revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the revolving speed V3 of the rolls 4a and 4b.
[0019]
What is necessary is just to use the driving means linked to the solid of revolution 2, the strip feeding means 3, and each of the rolls 4a and 4b, for example, an electric motor, as how to rotate rotation of the solid of revolution 2, strip supply of the strip feeding means 3, and the rolls 4a and 4b.
[0020]
The constitutional main features of this invention The revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the roll 4a, Rationalization of the speed balance of the revolving speed V3 of 4b is shown in planning, and more specifically, The speed control means 5 The revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the roll 4a, The strip attachment period whose revolving speed V3 of 4b is an unstationary state. In for example, the period of at least 1 of the attachment last stages including the time of the early stages of attachment including the time of an attachment start, and the end of attachment. The revolving speed V1 of the solid of revolution 2 when the strip 6 is able to be stuck properly, the strip speed of supply V2 of the strip feeding means 3, and the roll 4a, While computing

the change with time of the revolving speed V3 of 4b, respectively and sticking the strip 6 by said unstationary state, it is in controlling the revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the revolving speed V3 of the rolls 4a and 4b based on this computed result.

[0021]

And generating of faults, such as a fracture of a strip and regurgitation of excessive rubber, in the above-mentioned unstationary state where the revolving speed of a solid of revolution, the strip speed of supply of a strip feeding means, and the revolving speed of a roll are not stabilized easily can be effectively controlled by adopting the above-mentioned composition.

[0022]

The speed control means 5 mainly comprises the calculating means 7 and the controller 8.

[0023]

The calculating means 7 a computer as shown, for example in drawing 1, The change with time of the revolving speed V1 of the solid of revolution 2 when the strip 6 is able to be properly stuck in the strip attachment period which is an unstationary state, the strip speed of supply V2 of the strip feeding means 3, and the revolving speed V3 of the rolls 4a and 4b is computed, respectively.

[0024]

The controller 8 controls properly the revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the revolving speed V3 of the rolls 4a and 4b based on the result computed by the calculating means 7 and the calculating means 7. Although drawing 1 has shown the case where the controllers 8a, 8b, and 8c are independently formed in the solid of revolution 2, the strip feeding means 3, and each of the rolls 4a and 4b, The revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the revolving speed V3 of the rolls 4a and 4b may be controlled only by one controller.

[0025]

Although the speed control means 5 controls the revolving speed V1 of a solid of revolution, the strip speed of supply V2 of a strip feeding means, and the revolving speed V3 of a roll to become predetermined speed balance, If the acceleration pattern which fills the relation in which it is V1=V3 and V2-/V3 ratio dwindles the control in the early stages of attachment including the time of the attachment start which is an unstationary state in which speed balance does not become settled performs, The ribbon base strip extruded from the cap of the extruder can be effectively prevented from fracturing between a cap and a pasting roll.

[0026]

Drawing 3 shows an example of the change with time of the motor rotation frequency at the time of controlling by the acceleration pattern which fills the relation whose early stages of attachment including the time of an attachment start are V1=V3 and V2-/V3 ratio dwindles from 1.

[0027]

If the deceleration pattern which is V1=V3 about the control in the attachment last stage including the time of the end of attachment which is an unstationary state in which speed balance does not become settled, and fills the relation of V3>V2 performs the speed control means 5, Since the pressure in the head of an extruder can fully be lowered, excessive rubber can be effectively prevented from being breathed out.

[0028]

Drawing 4 shows an example of the change with time of the motor rotation frequency at the time of controlling by the deceleration pattern which is V1=V3 about the attachment last stage including the time of the end of attachment, and fills the relation of V3>V2.

[0029]

The calculating method of an acceleration pattern, a deceleration pattern, etc. may be searched for from a diagram, or may be searched for by a formula. These patterns can be set up according to the kinds (for example, the size of a strip, gum, rubber discharge temperature of an extruder, etc.) of ribbon base strip to stick. These patterns may be changed in the capability of a driving means, for example, an electric motor, and the inertia force of a solid of revolution.

[0030]

Next, an example of the molding method of the tire member of this invention is explained below. First, in order to control the revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the revolving speed V3 of the rolls 4a and 4b, By computer 7 which is a calculating means which constitutes the speed control means 5. The revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the roll 4a, The change with time of the revolving speed V1 of the solid of revolution 2 when the strip 6 is able to

be properly stuck in the strip attachment period whose revolving speed V3 of 4b is an unstationary state, the strip speed of supply V2 of the strip feeding means 3, and the revolving speed V3 of the rolls 4a and 4b is computed, respectively.
[0031]
Subsequently, the result computed by computer 7 is transmitted to the controllers 8a-8c, While the controllers 8a-8c control the revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the revolving speed V3 of the rolls 4a and 4b based on the transmitted computed result, A tire member can be molded by sticking spirally, conveying the ribbon base strip 6 on the solid of revolution 2 via the rolls 4a and 4b of a couple from the strip feeding means 3, and pressing a strip with the roll 4a on the outside surface of the solid of revolution 2.
[0032]
And if a tire member is molded with the molding method according to this invention, The discharge quantity of the excessive rubber in the attachment last stage which generating of a fracture of the strip in the early stages of attachment including the time of an attachment start becomes that there is nothing, and includes the time of the end of attachment can be decreased about 50% compared with the conventional molding method which performed the conventional speed control.
[0033]
The place mentioned above only showed an example of the embodiment of this invention, and can add various change in a claim.
[0034]
[Effect of the Invention]
According to this invention, by attaining rationalization of the speed balance of the revolving speed of a solid of revolution, the strip speed of supply of a strip feeding means, and the revolving speed of a roll, Like the attachment last stage including the time of the early stages of attachment including especially the time of an attachment start, and the end of attachment, The molding apparatus of a tire member and offer of a molding method which controlled effectively generating of faults, such as a fracture of a strip and regurgitation of excessive rubber, in the unstationary state where the revolving speed of a solid of revolution, the strip speed of supply of a strip feeding means, and the revolving speed of a roll are not stabilized easily were attained.
[Brief Description of the Drawings]
[Drawing 1]It is a schematic diagram showing an example of the molding apparatus of a tire member according to this invention.
[Drawing 2]It is an outline side view for explaining the solid of revolution, strip feeding means, and the physical relationship of a roll and the attachment state of a ribbon base strip which are shown in drawing 1.
[Drawing 3]It is a figure showing an example of the change with time of the motor rotation frequency at the time of controlling by the acceleration pattern which fills the relation whose early stages of attachment including the time of an attachment start are V1=V3 and V2-/V3 ratio dwindles from 1.
[Drawing 4]It is a figure showing an example of the change with time of the motor rotation frequency at the time of controlling by the deceleration pattern which is V1=V3 about the attachment last stage including the time of the end of attachment, and fills the relation of V3>V2.
[Description of Notations]
1 A molding apparatus of a tire member
2 Solid of revolution (or rigid body core)
3 A feed unit of a ribbon base strip (or extrusion machine)
4a and 4b Roll
5 Speed control means
6 Ribbon base strip
7 Computer
8, 8a, 8b, and 8c Controller

[Translation done.]

TECHNICAL FIELD

[Field of the Invention]
Especially this invention like the early stages of attachment including the time of an attachment start, and the attachment last stage including the time of the end of attachment, It is related with the molding apparatus and molding method of a tire member which controlled effectively generating of faults, such as a fracture of a strip, and regurgitation of excessive rubber, in the unstationary state where the speed balance of the revolving speed of a solid of revolution, the strip speed of supply of a strip feeding means, and the revolving speed of a roll is not stabilized easily.
[0002]

[Translation done.]

PRIOR ART

[Description of the Prior Art]
In order to make diameter expansion deformation in a tire molding process as small as possible and to raise the quality of product tires, such as uniformity, in recent years, Without preparing individually tire members, such as an inner liner, a bead filler, side rubber, and tread rubber, It laminates until it carries out time winding two or more rounds spirally and the shape of a predetermined tire member is obtained, pressing a ribbon base strip with a roll on the rigid body core which has the inner surface shape of a product tire, and the approximated outside surface shape, What is called the core molding method for forming a green tire and manufacturing a tire by carrying out vulcanization molding of this green tire with a rigid body core is proposed.
[0003]
When sticking a ribbon base strip on a rigid body core in the core molding method, it is necessary to control the revolving speed of a solid of revolution, for example, a rigid body core, a strip feeding means, for example, the strip speed of supply of an extruder, and the revolving speed of a roll, respectively but, and. It was common to have stuck such speed from the time of an attachment start, and to have controlled them by fixed speed balance in all the attachment periods over the time of an end conventionally.
[0004]
However, even if it is a case where it sets up control the revolving speed of a rigid body core, the strip speed of supply of an extruder, and the revolving speed of a roll by fixed speed balance, Since each driving means, for example, the performance of a motor, differs from the speed of response (sensitivity) at the time of acceleration and a slowdown (at the time of a motor operation) (at the time of a motor stop) in many cases, actually, In an unstationary state like the case like the early stages of attachment including the time of an attachment start, and the attachment last stage including the time of the end of attachment. The speed balance of the revolving speed of a rigid body core, the strip speed of supply of an extruder, and the revolving speed of a roll has collapsed in many cases, and, in this case, there was a possibility that there might be no proper attachment on the outside surface of a solid of revolution about a strip in ******.
[0005]
When a ribbon base strip is especially stuck on the outside surface of a rigid body core at high speed for Hitoshi Kougami of attachment efficiency, in early stages of the attachment including the time of an attachment start, Since the extrusion speed of the ribbon base strip extruded from an extruder tends to become quite slower than the value of the speed balance to the revolving speed of the solid of revolution which sticks the strip, If the ribbon base strip extruded from the cap of the extruder carries out the quick stop of the attachment of a ribbon base strip like the attachment last stage which a fracture may occur between a cap and a pasting roll, and includes the time of the end of attachment, Since the extrusion speed of the ribbon base strip extruded from an extruder tends to become quite quicker than the value of the speed balance to the revolving speed of the solid of revolution which sticks the strip, it is necessary to remove separately manually etc. the excessive rubber which excessive rubber is breathed out by the residual pressure in the head of an extruder at, is easy, and starts -- etc. -- various faults arose.
[0006]

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention]
In this invention, rationalization of the speed balance of the revolving speed of a solid of revolution, the strip speed of supply of a strip feeding means, and the revolving speed of a roll is attained. Therefore, like the attachment last stage including the time of the early stages of attachment including especially the time of an attachment start, and the end of attachment, The molding apparatus of a tire member and offer of a molding method which controlled effectively generating of faults, such as a fracture of a strip and regurgitation of excessive rubber, in the unstationary state where the revolving speed of a solid of revolution, the strip speed of supply of a strip feeding means, and the revolving speed of a roll are not stabilized easily were attained.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]
The purpose of this invention by attaining rationalization of the speed balance of the revolving speed of a solid of revolution, the strip speed of supply of a strip feeding means, and the revolving speed of a roll, Like the attachment last stage including the time of the early stages of attachment including especially the time of an attachment start, and the end of attachment, It is in providing the molding apparatus and molding method of a tire member which controlled effectively generating of faults, such as a fracture of a strip, and regurgitation of excessive rubber, in the unstationary state where the revolving speed of a solid of revolution, the strip speed of supply of a strip feeding means, and the revolving speed of a roll are not stabilized easily.
[0007]

[Translation done.]

MEANS

[Means for Solving the Problem]
In order to attain the above-mentioned purpose, a molding apparatus of a tire member of this invention, A solid of revolution with an outside surface of cylindrical shape or toroid shape, and a strip feeding means which supplies a ribbon base strip to this solid of revolution, A roll of a couple spirally stuck while counter a solid of revolution, it is located, and said strip supplied from a strip feeding means is conveyed toward a solid of revolution and said strip is pressed on an outside surface of a solid of revolution, In a molding apparatus of a tire member which it has, a speed control means which controls revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll a speed control means, Revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll in a strip attachment period which is an unstationary state. Revolving speed of a solid of revolution when a strip is able to be stuck properly, A change with time of a strip speed of supply of a strip feeding means and revolving speed of a roll is computed, respectively, While sticking a strip by said unstationary state, it is in controlling revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll based on this computed result.
[0008]
"A strip attachment period which is an unstationary state" here means a period of at least 1 of the attachment last stages including the time of early stages of attachment including the time of an attachment start, and an end of attachment.
[0009]
In a strip attachment period whose speed control means is an unstationary state. A calculating means which computes a change with time of revolving speed of a solid of revolution when a strip is able to be stuck properly, a strip speed of supply of a strip feeding means, and revolving speed of a roll, respectively, It is preferred to have a controller which controls properly revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll based on a result computed by a calculating means.
[0010]
When a speed control means sets [revolving speed of a solid of revolution] V2 and revolving speed of a roll to V3 for a strip speed of supply of V1 and a strip feeding means, It is preferred to control by a deceleration pattern which is V1=V3 and fills a relation of V3>V2 with to control by an acceleration pattern which fills a relation which is V1=V3 and V2-/V3 ratio dwindles in early stages of the attachment including the time of an attachment start, and/or the attachment last stage including the time of an end of attachment. It is preferred to stick on an outside surface of a solid of revolution, setting up V2-/V3 ratio in early stages of the attachment which includes the time of an attachment start especially gradually decrease from 1 to proper V2-/V3 ratio of a stationary state, and applying a proper tension to said strip. Although proper V2-/V3 ratio of a stationary state changes also with kinds (for example, a size of a strip, gum, rubber discharge temperature of an extruder, etc.) of ribbon base strip to stick, it is preferred for it that it is the range of 0.3-0.7.
[0011]
A molding method of a tire member of this invention, controlling revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll by a speed control means. In a molding method of a tire member spirally stuck while conveying a ribbon base strip on a solid of revolution via a roll of a couple from a strip feeding means and pressing a strip with a roll on an outside surface of a solid of revolution, Revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll a speed control means in a strip attachment period which is an unstationary state. Revolving speed of a solid of revolution when a strip is able to be stuck properly, A change with time of a strip speed of supply of a strip feeding

means and revolving speed of a roll is computed, respectively, While sticking a strip by said unstationary state, it is in controlling revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll based on this computed result.
[0012]
In a strip attachment period whose calculating means a speed control means has a calculating means and a controller, and is an unstationary state. Revolving speed of a solid of revolution when a strip is able to be stuck properly, A change with time of a strip speed of supply of a strip feeding means and revolving speed of a roll is computed, respectively, It is preferred that transmit a computed result to a controller and a controller controls revolving speed of a solid of revolution, a strip speed of supply of a strip feeding means, and revolving speed of a roll based on a transmitted computed result.
[0013]
[Embodiment of the Invention]
Hereafter, an example of this embodiment of the invention is explained in detail, referring to drawings.

Drawing 1 shows an example of the molding apparatus 1 of a tire member according to this invention.
[0014]
The solid of revolution 2, the strip feeding means 3, and a couple roll the molding apparatus 1 of the tire member shown in drawing 1 4a and 4b, and it mainly comprises the speed control means 5. Drawing 2 is shown in order to explain the physical relationship of the rolls 4a and 4b of the solid of revolution 2, the strip feeding means 3, and a couple, and the attachment state of a ribbon base rubber strip.
[0015]
Although it has an outside surface of cylindrical shape or toroid shape and drawing 1 has shown the case where it is a rigid body core as an example of a hard core process, like a raw case, a green tire, a bladder, and a molding drum, the solid of revolution 2 should just be a solid of revolution with the outside surface of cylindrical shape or toroid shape, and does not carry out limitation in particular.
[0016]
Are for the strip feeding means 3 supplying the ribbon base rubber strip 6 to this solid of revolution 2, and in drawing 1. Although the extruder 3 which supplies the ribbon base strip 6 by extruding the rubber of predetermined sectional shape from the cap 3a, and the case where it is a screw motor control type extruder especially are shown, A piston delivery speed control type extruder and a screw and gearmotor control type extruder may be used, and limitation in particular is not carried out. For example, time spiral winding of the ribbon base strip produced beforehand may be carried out two or more rounds spirally, and a ribbon base strip may be supplied from this coiled member as a coiled member.
[0017]
While the rolls 4a and 4b of a couple convey said strip 6 which countered the solid of revolution 2, was located and was supplied from the strip feeding means 3 toward the solid of revolution 2, Pressing said strip 6 on the outside surface of the solid of revolution 2, the roll 4a of any one of these rolls 4a and 4b is allocated so that it may stick spirally.
[0018]
The speed control means 5 controls the revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the revolving speed V3 of the rolls 4a and 4b.
[0019]
What is necessary is just to use the driving means linked to the solid of revolution 2, the strip feeding means 3, and each of the rolls 4a and 4b, for example, an electric motor, as how to rotate rotation of the solid of revolution 2, strip supply of the strip feeding means 3, and the rolls 4a and 4b.
[0020]
The constitutional main features of this invention The revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the roll 4a, Rationalization of the speed balance of the revolving speed V3 of 4b is shown in planning, and more specifically, The speed control means 5 The revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the roll 4a, The strip attachment period whose revolving speed V3 of 4b is an unstationary state. In for example, the period of at least 1 of the attachment last stages including the time of the early stages of attachment including the time of an attachment start, and the end of attachment. The revolving speed V1 of the solid of revolution 2 when the strip 6 is able to be stuck properly, the strip speed of supply V2 of the strip feeding means 3, and the roll 4a, While computing the change with time of the revolving speed V3 of 4b, respectively and sticking the strip 6 by said unstationary state, it is in controlling the revolving speed V1 of the solid of revolution 2, the strip

speed of supply V2 of the strip feeding means 3, and the revolving speed V3 of the rolls 4a and 4b based on this computed result.

[0021]

And generating of faults, such as a fracture of a strip and regurgitation of excessive rubber, in the above-mentioned unstationary state where the revolving speed of a solid of revolution, the strip speed of supply of a strip feeding means, and the revolving speed of a roll are not stabilized easily can be effectively controlled by adopting the above-mentioned composition.

[0022]

The speed control means 5 mainly comprises the calculating means 7 and the controller 8.

[0023]

The calculating means 7 a computer as shown, for example in drawing 1, The change with time of the revolving speed V1 of the solid of revolution 2 when the strip 6 is able to be properly stuck in the strip attachment period which is an unstationary state, the strip speed of supply V2 of the strip feeding means 3, and the revolving speed V3 of the rolls 4a and 4b is computed, respectively.

[0024]

The controller 8 controls properly the revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the revolving speed V3 of the rolls 4a and 4b based on the result computed by the calculating means 7 and the calculating means 7. Although drawing 1 has shown the case where the controllers 8a, 8b, and 8c are independently formed in the solid of revolution 2, the strip feeding means 3, and each of the rolls 4a and 4b, The revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the revolving speed V3 of the rolls 4a and 4b may be controlled only by one controller.

[0025]

Although the speed control means 5 controls the revolving speed V1 of a solid of revolution, the strip speed of supply V2 of a strip feeding means, and the revolving speed V3 of a roll to become predetermined speed balance, If the acceleration pattern which fills the relation in which it is V1=V3 and V2-/V3 ratio dwindles the control in the early stages of attachment including the time of the attachment start which is an unstationary state in which speed balance does not become settled performs, The ribbon base strip extruded from the cap of the extruder can be effectively prevented from fracturing between a cap and a pasting roll.

[0026]

Drawing 3 shows an example of the change with time of the motor rotation frequency at the time of controlling by the acceleration pattern which fills the relation whose early stages of attachment including the time of an attachment start are V1=V3 and V2-/V3 ratio dwindles from 1.

[0027]

If the deceleration pattern which is V1=V3 about the control in the attachment last stage including the time of the end of attachment which is an unstationary state in which speed balance does not become settled, and fills the relation of V3>V2 performs the speed control means 5, Since the pressure in the head of an extruder can fully be lowered, excessive rubber can be effectively prevented from being breathed out.

[0028]

Drawing 4 shows an example of the change with time of the motor rotation frequency at the time of controlling by the deceleration pattern which is V1=V3 about the attachment last stage including the time of the end of attachment, and fills the relation of V3>V2.

[0029]

The calculating method of an acceleration pattern, a deceleration pattern, etc. may be searched for from a diagram, or may be searched for by a formula. These patterns can be set up according to the kinds (for example, the size of a strip, gum, rubber discharge temperature of an extruder, etc.) of ribbon base strip to stick. These patterns may be changed in the capability of a driving means, for example, an electric motor, and the inertia force of a solid of revolution.

[0030]

Next, an example of the molding method of the tire member of this invention is explained below. First, in order to control the revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the revolving speed V3 of the rolls 4a and 4b, By computer 7 which is a calculating means which constitutes the speed control means 5. The revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the roll 4a, The change with time of the revolving speed V1 of the solid of revolution 2 when the strip 6 is able to be properly stuck in the strip attachment period whose revolving speed V3 of 4b is an unstationary state, the strip speed of supply V2 of the strip feeding means 3, and the revolving speed V3 of the

rolls 4a and 4b is computed, respectively.
[0031]
Subsequently, the result computed by computer 7 is transmitted to the controllers 8a-8c, While the controllers 8a-8c control the revolving speed V1 of the solid of revolution 2, the strip speed of supply V2 of the strip feeding means 3, and the revolving speed V3 of the rolls 4a and 4b based on the transmitted computed result, A tire member can be molded by sticking spirally, conveying the ribbon base strip 6 on the solid of revolution 2 via the rolls 4a and 4b of a couple from the strip feeding means 3, and pressing a strip with the roll 4a on the outside surface of the solid of revolution 2.
[0032]
And if a tire member is molded with the molding method according to this invention, The discharge quantity of the excessive rubber in the attachment last stage which generating of a fracture of the strip in the early stages of attachment including the time of an attachment start becomes that there is nothing, and includes the time of the end of attachment can be decreased about 50% compared with the conventional molding method which performed the conventional speed control.
[0033]
The place mentioned above only showed an example of the embodiment of this invention, and can add various change in a claim.
[0034]

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is a schematic diagram showing an example of the molding apparatus of a tire member according to this invention.
[Drawing 2]It is an outline side view for explaining the solid of revolution, strip feeding means, and the physical relationship of a roll and the attachment state of a ribbon base strip which are shown in drawing 1.
[Drawing 3]It is a figure showing an example of the change with time of the motor rotation frequency at the time of controlling by the acceleration pattern which fills the relation whose early stages of attachment including the time of an attachment start are V1=V3 and V2-/V3 ratio dwindles from 1.
[Drawing 4]It is a figure showing an example of the change with time of the motor rotation frequency at the time of controlling by the deceleration pattern which is V1=V3 about the attachment last stage including the time of the end of attachment, and fills the relation of V3>V2.
[Description of Notations]
1 A molding apparatus of a tire member
2 Solid of revolution (or rigid body core)
3 A feed unit of a ribbon base strip (or extrusion machine)
4a and 4b Roll
5 Speed control means
6 Ribbon base strip
7 Computer
8, 8a, 8b, and 8c Controller

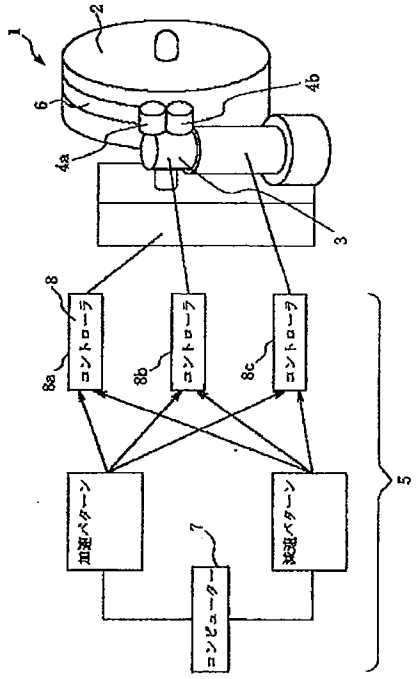
[Translation done.]

* NOTICES *

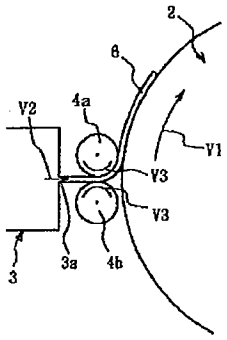
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

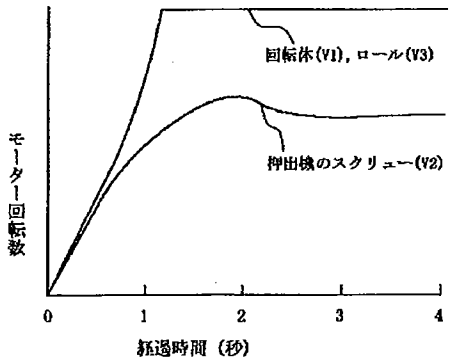
[Drawing 1]



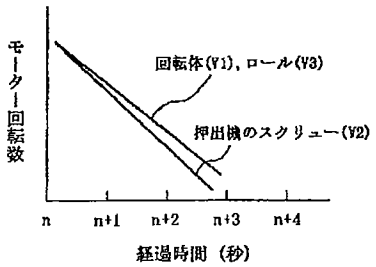
[Drawing 2]



[Drawing 3]



[Drawing 4]



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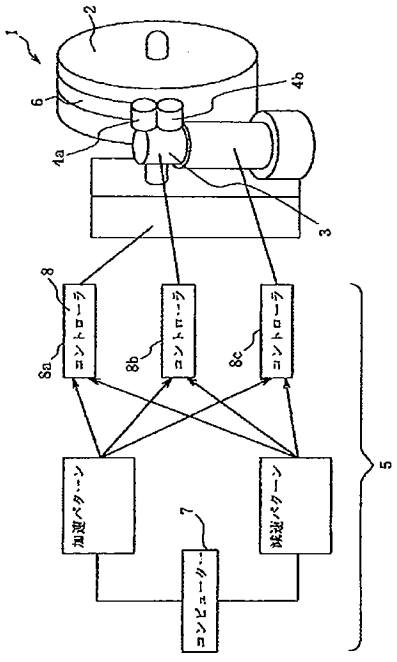
(54)【発明の名称】タイヤ部材の成型装置及び成型方法

(57)【要約】
【課題】回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度が安定しにくい非定常状態における、ストリップの破断や余分なゴムの吐出等の不具合の発生を抑制したタイヤ部材の成型装置等を提供する。
【解決手段】この発明のタイヤ部材の成型装置１は、回転体２、ストリップ供給手段３、一対のロール４ａ，４ｂ及び速度制御手段５とを具え、速度制御手段５は、回転体２の回転速度Ｖ１、ストリップ供給手段３のストリップ供給速度Ｖ２及びロール４ａ，４ｂの回転速度Ｖ３が非定常状態であるストリップ貼付け期間にて、ストリップ６を適正に貼り付けることができたときの、各速度Ｖ１～Ｖ３の経時的変化をそれぞれ算出し、前記非定常状態でストリップ６を貼り付ける間、この算出した結果に基づいて、回転体２の回転速度Ｖ１、ストリップ供給手段３のストリップ供給速度Ｖ２及びロール４ａ，４ｂの回転速度Ｖ３を制御することを特徴とする。
【選択図】　図１



【特許請求の範囲】
【請求項１】
円筒状又はトロイド状の外面をもつ回転体と、
該回転体に対しリボン状ストリップを供給するストリップ供給手段と、
回転体に対向して位置し、ストリップ供給手段から供給された前記ストリップを回転体に向かって搬送し、かつ回転体の外面上に前記ストリップを押圧しながららせん状に貼り付ける一対のロールと、
回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度を制御する速度制御手段と、
を具えるタイヤ部材の成型装置において、
速度制御手段は、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度が非定常状態であるストリップ貼付け期間にて、ストリップを適正に貼り付けることができたときの、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度の経時的変化をそれぞれ算出し、前記非定常状態でストリップを貼り付ける間、この算出した結果に基づいて、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度を制御することを特徴とするタイヤ部材の成型装置。
【請求項２】
非定常状態であるストリップ貼付け期間は、貼付け開始時を含む貼付け初期及び貼付け終了時を含む貼付け末期のうちの少なくとも一の期間である請求項１記載のタイヤ部材の成形装置。
【請求項３】
速度制御手段は、非定常状態であるストリップ貼付け期間にて、ストリップを適正に貼り付けることができたときの、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度の経時的変化をそれぞれ算出する演算手段と、演算手段によって算出した結果に基づいて、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度を適正に制御するコントローラとを有する請求項１又は２記載のタイヤ部材の成型装置。
【請求項４】
速度制御手段は、回転体の回転速度をＶ１、ストリップ供給手段のストリップ供給速度をＶ２、及びロールの回転速度をＶ３とするとき、貼付け開始時を含む貼付け初期にて、Ｖ１＝Ｖ３でかつＶ２／Ｖ３比が漸減する関係を満たす加速パターンで制御する請求項２又は３記載のタイヤ部材の成型装置。
【請求項５】
速度制御手段は、回転体の回転速度をＶ１、ストリップ供給手段のストリップ供給速度をＶ２、及びロールの回転速度をＶ３とするとき、貼付け終了時を含む貼付け末期にて、Ｖ１＝Ｖ３でかつＶ３＞Ｖ２の関係を満たす減速パターンで制御する請求項２、３又は４記載のタイヤ部材の成型装置。
【請求項６】
速度制御手段によって、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度を制御しながら、ストリップ供給手段から一対のロールを介して回転体上にリボン状ストリップを搬送し、回転体の外面上にロールでストリップを押圧しながららせん状に貼り付けるタイヤ部材の成型方法において、
速度制御手段は、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度が非定常状態であるストリップ貼付け期間にて、ストリップを適正に貼り付けることができたときの、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度の経時的変化をそれぞれ算出し、前記非定常状態でストリップを貼り付ける間、この算出した結果に基づいて、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度を制御することを特徴とするタイヤ部材の成型方法。

【請求項７】
速度制御手段は、演算手段とコントローラを有し、演算手段が非定常状態であるストリップ貼付け期間にて、ストリップを適正に貼り付けることができたときの、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度の経時的変化をそれぞれ算出し、算出した結果をコントローラに転送し、コントローラが、転送された算出結果に基づいて、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度を制御する請求項６記載のタイヤ部材の成型方法。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】
この発明は、特に貼付け開始時を含む貼付け初期や、貼付け終了時を含む貼付け末期のように、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度の速度バランスが安定しにくい非定常状態における、ストリップの破断や余分なゴムの吐出等の不具合の発生を有効に抑制したタイヤ部材の成型装置及び成型方法に関するものである。
【０００２】
【従来の技術】
近年、タイヤ成型工程での拡径変形をできるだけ小さくしてユニフォミティ等の製品タイヤの品質を向上させるため、インナーライナー、ビードフィラー、サイドゴム、トレッドゴム等のタイヤ部材を個別に準備することなく、製品タイヤの内面形状と近似した外面形状を有する剛体コアの上にリボン状ストリップをロールで押圧しながららせん状に複数周回巻回して所定のタイヤ部材の形状が得られるまで積層し、生タイヤを形成し、この生タイヤを剛体コアとともに、加硫成型することによってタイヤを製造する、いわゆるコア成型法が提案されている。
【０００３】
コア成型法において剛体コアにリボン状ストリップを貼り付ける場合、回転体、例えば剛体コアの回転速度、ストリップ供給手段、例えば押出し機のストリップ供給速度、及びロールの回転速度をそれぞれ制御する必要があるが、従来は、これらの速度を、貼付け開始時から貼付け終了時にわたる全貼付け期間において、一定の速度バランスで制御するのが一般的であった。
【０００４】
しかしながら、剛体コアの回転速度、押出し機のストリップ供給速度及びロールの回転速度を一定の速度バランスで制御するように設定した場合であっても、それぞれの駆動手段、例えばモータの性能、特に加速時（モータ作動時）や減速時（モータ停止時）の応答速度（感度）が異なることが多いため、実際には、貼付け開始時を含む貼付け初期や、貼付け終了時を含む貼付け末期のような場合のような非定常状態では、剛体コアの回転速度、押出し機のストリップ供給速度及びロールの回転速度の速度バランスが崩れている場合が多く、かかる場合には、ストリップを回転体の外面上に適正な貼付けが行わえないおそれがあった。
【０００５】
特に、貼付け効率の向上等のため、高速にて剛体コアの外面上にリボン状ストリップの貼付けを行った場合、貼付け開始時を含む貼付け初期には、押出し機から押出されるリボン状ストリップの押出し速度が、そのストリップを貼り付ける回転体の回転速度に対する速度バランスの値よりもかなり遅くなりがちであるため、押出し機の口金から押し出されたリボン状ストリップが口金と貼付ロール間で破断が発生することがあり、また、貼付け終了時を含む貼付け末期のようにリボン状ストリップの貼付けを急停止すると、押出し機から押出されるリボン状ストリップの押出し速度が、そのストリップを貼り付ける回転体の回転速度に対する速度バランスの値よりもかなり速くなりがちであるため、押出し機のヘッド内の残圧により余分なゴムが吐出されやすく、かかる余分なゴムを別途手作業等で取り除く必要がある等の種々の不具合が生じた。

【０００６】
【発明が解決しようとする課題】
この発明の目的は、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度の速度バランスの適正化を図ることにより、特に貼付け開始時を含む貼付け初期及び貼付け終了時を含む貼付け末期のように、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度が安定しにくい非定常状態における、ストリップの破断や余分なゴムの吐出等の不具合の発生を有効に抑制したタイヤ部材の成型装置及び成型方法を提供することにある。
【０００７】
【課題を解決するための手段】
上記目的を達成するため、この発明のタイヤ部材の成型装置は、円筒状又はトロイド状の外面をもつ回転体と、該回転体に対しリボン状ストリップを供給するストリップ供給手段と、回転体に対向して位置し、ストリップ供給手段から供給された前記ストリップを回転体に向かって搬送し、かつ回転体の外面上に前記ストリップを押圧しながららせん状に貼り付ける一対のロールと、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度を制御する速度制御手段とを具えるタイヤ部材の成型装置において、速度制御手段は、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度が非定常状態であるストリップ貼付け期間にて、ストリップを適正に貼り付けることができたときの、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度の経時的変化をそれぞれ算出し、前記非定常状態でストリップを貼り付ける間、この算出した結果に基づいて、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度を制御することにある。
【０００８】
尚、ここでいう「非定常状態であるストリップ貼付け期間」は、貼付け開始時を含む貼付け初期及び貼付け終了時を含む貼付け末期のうちの少なくとも一の期間を意味する。
【０００９】
また、速度制御手段は、非定常状態であるストリップ貼付け期間にて、ストリップを適正に貼り付けることができたときの、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度の経時的変化をそれぞれ算出する演算手段と、演算手段によって算出した結果に基づいて、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度を適正に制御するコントローラとを有することが好ましい。
【００１０】
さらに、速度制御手段は、回転体の回転速度をＶ１、ストリップ供給手段のストリップ供給速度をＶ２、及びロールの回転速度をＶ３とするとき、貼付け開始時を含む貼付け初期にて、Ｖ１＝Ｖ３でかつＶ２／Ｖ３比が漸減する関係を満たす加速パターンで制御すること、及び／又は、貼付け終了時を含む貼付け末期にて、Ｖ１＝Ｖ３でかつＶ３＞Ｖ２の関係を満たす減速パターンで制御することが好ましい。特に、貼付け開始時を含む貼付け初期では、Ｖ２／Ｖ３比を、１から定常状態の適正なＶ２／Ｖ３比へ漸減するように設定して、前記ストリップに適正なテンションをかけながら回転体の外面上に貼り付けることが好ましい。尚、定常状態の適正なＶ２／Ｖ３比は、貼り付けるリボン状ストリップの種類（例えばストリップの寸法、ゴム質、押出し機のゴム吐出温度等）によっても異なるが、０．３～０．７の範囲であることが好適である。
【００１１】
この発明のタイヤ部材の成型方法は、速度制御手段によって、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度を制御しながら、ストリップ供給手段から一対のロールを介して回転体上にリボン状ストリップを搬送し、回転体の外面上にロールでストリップを押圧しながららせん状に貼り付けるタイヤ部材の成型方法において、速度制御手段は、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度が非定常状態であるストリップ貼付け期間にて、ストリップを適正に貼り付けることができたときの、回転体の回転速度、ストリップ供給手段のストリップ供

給速度及びロールの回転速度の経時的変化をそれぞれ算出し、前記非定常状態でストリップを貼り付ける間、この算出した結果に基づいて、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度を制御することにある。

【００１２】

また、速度制御手段は、演算手段とコントローラを有し、演算手段が非定常状態であるストリップ貼付け期間にて、ストリップを適正に貼り付けることができたときの、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度の経時的変化をそれぞれ算出し、算出した結果をコントローラに転送し、コントローラが、転送された算出結果に基づいて、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度を制御することが好ましい。

【００１３】

【発明の実施の形態】

以下、この発明の実施の形態の一例を図面を参照しながら詳細に説明する。

図１は、この発明に従うタイヤ部材の成型装置１の一例を示したものである。

【００１４】

図１に示すタイヤ部材の成型装置１は、回転体２、ストリップ供給手段３、一対のロール４ａ、４ｂ、及び速度制御手段５とで主に構成されている。図２は、回転体２、ストリップ供給手段３および一対のロール４ａ、４ｂの位置関係およびリボン状ゴムストリップの貼付け状態を説明するために示したものである。

【００１５】

回転体２は、円筒状又はトロイド状の外面をもち、図１ではハードコア製法の例として剛体コアである場合を示してあるが、生ケース、生タイヤ、ブラダー、成型ドラム等のように、円筒状又はトロイド状の外面をもつ回転体であればよく、特に限定はしない。

【００１６】

ストリップ供給手段３は、該回転体２に対しリボン状ゴムストリップ６を供給するためのものであり、図１では、口金３ａから所定の断面形状のゴムを押出すことによってリボン状ストリップ６を供給する押出し機３、特にスクリューモータ制御タイプの押出し機である場合を示してあるが、ピストン送りスピード制御タイプの押出し機や、スクリューとギヤモータ制御タイプの押出し機でもよく、特に限定はしない。例えば、予め作製したリボン状ストリップをらせん状に複数周回螺旋巻回してコイル状部材としてこのコイル状部材からリボン状ストリップを供給してもよい。

【００１７】

一対のロール４ａ、４ｂは、回転体２に対向して位置し、ストリップ供給手段３から供給された前記ストリップ６を回転体２に向かって搬送するとともに、これらのロール４ａ、４ｂのうちのいずれか１本のロール４ａは、回転体２の外面上に前記ストリップ６を押圧しながららせん状に貼り付けるように配設する。

【００１８】

速度制御手段５は、回転体２の回転速度Ｖ１、ストリップ供給手段３のストリップ供給速度Ｖ２及びロール４ａ、４ｂの回転速度Ｖ３を制御する。

【００１９】

尚、回転体２の回転、ストリップ供給手段３のストリップ供給、及びロール４ａ、４ｂの回転させる方法としては、回転体２、ストリップ供給手段３及びロール４ａ、４ｂのそれぞれに接続した駆動手段、例えば電動モータを用いればよい。

【００２０】

この発明の構成上の主な特徴は、回転体２の回転速度Ｖ１、ストリップ供給手段３のストリップ供給速度Ｖ２及びロール４ａ、４ｂの回転速度Ｖ３の速度バランスの適正化を図ることにあり、より具体的には、速度制御手段５は、回転体２の回転速度Ｖ１、ストリップ供給手段３のストリップ供給速度Ｖ２及びロール４ａ、４ｂの回転速度Ｖ３が非定常状態であるストリップ貼付け期間、例えば、貼付け開始時を含む貼付け初期及び貼付け終了時を含む貼付け末期のうちの少なくとも一の期間にて、ストリップ６を適正に貼り付けるこ

とができたときの、回転体２の回転速度Ｖ１、ストリップ供給手段３のストリップ供給速度Ｖ２及びロール４ａ、４ｂの回転速度Ｖ３の経時的変化をそれぞれ算出し、前記非定常状態でストリップ６を貼り付ける間、この算出した結果に基づいて、回転体２の回転速度Ｖ１、ストリップ供給手段３のストリップ供給速度Ｖ２及びロール４ａ、４ｂの回転速度Ｖ３を制御することにある。

【００２１】

そして、上記構成を採用することにより、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度が安定しにくい上記非定常状態における、ストリップの破断や余分なゴムの吐出等の不具合の発生を有効に抑制することができる。

【００２２】

また、速度制御手段５は、演算手段７とコントローラ８とで主に構成されている。

【００２３】

演算手段７は、例えば図１に示すようなコンピューターは、非定常状態であるストリップ貼付け期間にて、ストリップ６を適正に貼り付けることができたときの、回転体２の回転速度Ｖ１、ストリップ供給手段３のストリップ供給速度Ｖ２及びロール４ａ、４ｂの回転速度Ｖ３の経時的変化をそれぞれ算出する。

【００２４】

コントローラー８は、演算手段７と、演算手段７によって算出した結果に基づいて、回転体２の回転速度Ｖ１、ストリップ供給手段３のストリップ供給速度Ｖ２及びロール４ａ、４ｂの回転速度Ｖ３を適正に制御する。尚、図１では、回転体２、ストリップ供給手段３及びロール４ａ、４ｂのそれぞれにコントローラー８ａ、８ｂ、８ｃを独立して設けた場合を示してあるが、１台のコントローラーだけで、回転体２の回転速度Ｖ１、ストリップ供給手段３のストリップ供給速度Ｖ２及びロール４ａ、４ｂの回転速度Ｖ３を制御してもよい。

【００２５】

速度制御手段５は、回転体の回転速度Ｖ１、ストリップ供給手段のストリップ供給速度Ｖ２及びロールの回転速度Ｖ３を所定の速度バランスになるように制御するが、速度バランスが定まらない非定常状態である貼付け開始時を含む貼付け初期における制御を、Ｖ１＝Ｖ３でかつＶ２／Ｖ３比が漸減する関係を満たす加速パターンで行えば、押出し機の口金から押し出されたリボン状ストリップが口金と貼付ロール間で破断するのを有効に防止することができる。

【００２６】

図３は、貼付け開始時を含む貼付け初期を、Ｖ１＝Ｖ３でかつＶ２／Ｖ３比が１から漸減する関係を満たす加速パターンで制御した場合のモータ回転数の経時的変化の一例を示したものである。

【００２７】

また、速度制御手段５は、速度バランスが定まらない非定常状態である貼付け終了時を含む貼付け末期における制御を、Ｖ１＝Ｖ３でかつＶ３＞Ｖ２の関係を満たす減速パターンで行えば、押出し機のヘッド内の圧力を十分に下げることができるので、余分なゴムが吐出されるのを有効に防止することができる。

【００２８】

図４は、貼付け終了時を含む貼付け末期を、Ｖ１＝Ｖ３でかつＶ３＞Ｖ２の関係を満たす減速パターンで制御した場合のモータ回転数の経時的変化の一例を示したものである。

【００２９】

尚、加速パターンや減速パターン等の算出方法は、ダイヤグラムから求めても、或いは、式によって求めてもよい。また、これらのパターンは、貼り付けるリボン状ストリップの種類（例えばストリップの寸法、ゴム質、押出し機のゴム吐出温度等）に応じて設定することができる。さらに、これらのパターンは、駆動手段、例えば電動モータの能力や、回転体の慣性力にて変更してもよい。

【００３０】

次に、この発明のタイヤ部材の成型方法の一例を以下で説明する。
まず、回転体２の回転速度Ｖ１、ストリップ供給手段３のストリップ供給速度Ｖ２及びロール４ａ、４ｂの回転速度Ｖ３を制御するため、速度制御手段５を構成する算出手段であるコンピューター７によって、回転体２の回転速度Ｖ１、ストリップ供給手段３のストリップ供給速度Ｖ２及びロール４ａ、４ｂの回転速度Ｖ３が非定常状態であるストリップ貼付け期間にて、ストリップ６を適正に貼り付けることができたときの、回転体２の回転速度Ｖ１、ストリップ供給手段３のストリップ供給速度Ｖ２及びロール４ａ、４ｂの回転速度Ｖ３の経時的変化をそれぞれ算出する。

【００３１】

次いで、コンピューター７によって算出した結果をコントローラ８ａ～８ｃに転送し、コントローラ８ａ～８ｃが、転送された算出結果に基づいて、、回転体２の回転速度Ｖ１、ストリップ供給手段３のストリップ供給速度Ｖ２及びロール４ａ、４ｂの回転速度Ｖ３を制御しながら、ストリップ供給手段３から一対のロール４ａ、４ｂを介して回転体２上にリボン状ストリップ６を搬送し、回転体２の外面上にロール４ａでストリップを押圧しながららせん状に貼り付けることによって、タイヤ部材を成型することができる。

【００３２】

そして、この発明に従う成型方法によってタイヤ部材を成型すれば、貼付け開始時を含む貼付け初期におけるストリップの破断の発生が皆無になり、また、貼付け終了時を含む貼付け末期における余分なゴムの吐出量を、従来の速度制御を行った従来の成型方法に比べて５０％程度減少させることができる。

【００３３】

上述したところは、この発明の実施形態の一例を示したにすぎず、請求の範囲において種々の変更を加えることができる。

【００３４】

【発明の効果】

この発明によれば、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度の速度バランスの適正化を図ることにより、特に貼付け開始時を含む貼付け初期及び貼付け終了時を含む貼付け末期のように、回転体の回転速度、ストリップ供給手段のストリップ供給速度及びロールの回転速度が安定しにくい非定常状態における、ストリップの破断や余分なゴムの吐出等の不具合の発生を有効に抑制したタイヤ部材の成型装置及び成型方法の提供が可能になった。

【図面の簡単な説明】

【図１】この発明に従うタイヤ部材の成型装置の一例を示す概略図である。

【図２】図１に示す回転体、ストリップ供給手段及びロールの位置関係とリボン状ストリップの貼付け状態を説明するための概略側面図である。

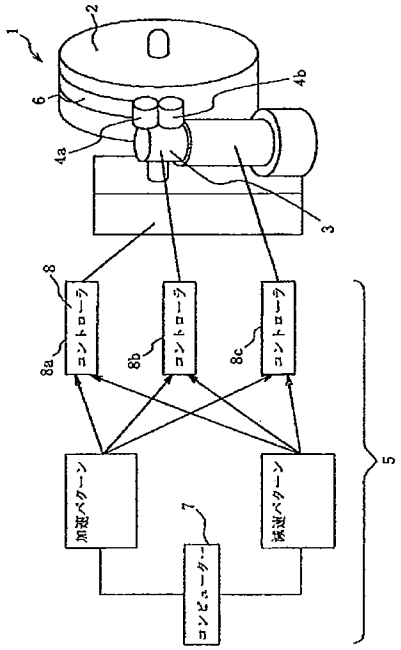
【図３】貼付け開始時を含む貼付け初期を、Ｖ１＝Ｖ３でかつＶ２／Ｖ３比が１から漸減する関係を満たす加速パターンで制御した場合のモータ回転数の経時的変化の一例を示した図である。

【図４】貼付け終了時を含む貼付け末期を、Ｖ１＝Ｖ３でかつＶ３＞Ｖ２の関係を満たす減速パターンで制御した場合のモータ回転数の経時的変化の一例を示した図である。

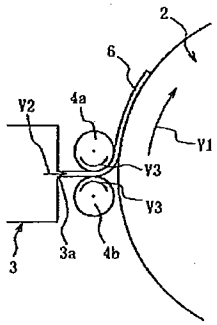
【符号の説明】

１　タイヤ部材の成型装置
２　回転体（又は剛体コア）
３　リボン状ストリップの供給装置（又は押出機）
４ａ，４ｂ　ロール
５　速度制御手段
６　リボン状ストリップ
７　コンピューター
８，８ａ，８ｂ，８ｃ　コントローラ

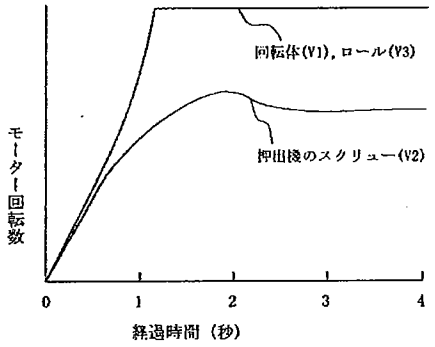
【図１】


1
2
4b
6
4a
3
8
8a
8b
8c
コントローラ
コントローラ
コントローラ
5
加速パターン
減速パターン
7
コンピューター

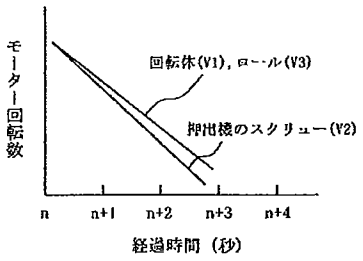
【図２】


2
6
V2
4a
V1
V3
V3
3
3a
4b

【図３】


回転体(V1)，ロール(V3)
押出機のスクリュー(V2)
モーター回転数
0
1
2
3
4
経過時間（秒）

【図４】


回転体(V1)，ロール(V3)
押出機のスクリュー(V2)
モーター回転数
n
n+1
n+2
n+3
n+4
経過時間（秒）